

17641

**11920**

**3 Hours / 100 Marks**

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
  - (2) Illustrate your answers with neat sketches wherever necessary.
  - (3) Figures to the right indicate full marks.
  - (4) Assume suitable data, if necessary.
  - (5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

**1. Attempt any FIVE of the following :**

**20**

- (a) Define the following :
  - (i) Push button
  - (ii) Selector switch
  - (iii) Proximity switch
  - (iv) Limit switch
- (b) Draw power and control circuit diagram of Forward – Stop – Reverse operation of three phase induction motor.
- (c) State the advantages and disadvantages of PLC.
- (d) Develop standard start-stop-seal circuit using Ladder Logic.
- (e) Why derivative action is not used alone ?
- (f) What is proximity sensor ? Explain capacitive type proximity sensor.
- (g) Compare Integral controller with derivative controller.

- 2. Attempt any TWO of the following :** **16**
- (a) Draw and explain power and control circuit of automatic star-delta starter with timer, for three phase induction motor.
  - (b) Draw a neat labelled block diagram of PLC. Explain the function of each block.
  - (c) Develop ladder diagram for automatic star-delta starter.
- 3. Attempt any FOUR of the following :** **16**
- (a) Draw and explain interlocking of contactors using push button switches.
  - (b) Draw power and control circuit diagram of forward and random reversing of three phase induction motor.
  - (c) Describe working of ON/OFF delay timer used in PLC.
  - (d) Draw ladder diagram for Logic operation of
    - (i) NOT Gate (verify with truth table)
    - (ii) AND Gate (verify with truth table)
  - (e) Draw and explain working of PI controllers.
  - (f) Draw the block diagram of PID controller and explain its working.
- 4. Attempt any TWO of the following :** **16**
- (a) Draw and explain power and control circuit of semi-automatic type star/delta starter for three phase induction motor.
  - (b) List and explain types of memory units used in PLC.
  - (c) Draw a Ladder diagram for two motor system having following conditions :
    - (i) Starting push button starts motor-1,
    - (ii) After 10 seconds motor-2 is ON,
    - (iii) Stop switch stops motor-1 and 2

**5. Attempt any FOUR of the following :****16**

- (a) Describe bimetallic thermal over-load relay with neat sketch.
- (b) Draw control circuit for simple plugging of induction motor.
- (c) List the specifications of Digital and Analog I/O modules with their ratings.
- (d) Draw ladder diagram to verify :
  - (i) OR Gate
  - (ii) Ex-OR Gate
- (e) Explain working of Integral controller.
- (f) Explain working of proportional controller.

**6. Attempt any TWO of the following :****16**

- (a) Draw and explain power and control circuit for definite time limit starter for Slip-ring induction motor.
  - (b) Draw block diagram of PLC power supply. Explain its working.
  - (c) List and explain in detail the different counters of PLC.
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